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Canine Orthopedic Devices



© A-TRAC DYNAMIC BRACE AND WOUNDWEAR

In the field of small animal orthopedics, orthoses, prostheses, and other assistive devices are an emerging technology that can aid in the well-being of canine patients. These devices are used to either correct or accommodate the affected limb(s) following trauma or surgical intervention, and may be used as temporary or permanent modes of treatment. Here, we'll introduce some new technologies in canine carpal and tarsal orthotics and other assistive devices including stifles braces, shoulder stabilization systems and custom Ehmer slings.

Devices

CCL Injury

Cranial cruciate ligament (CCL) injury in agility dogs is very common. Dogs with CCL injury can benefit from a custom stifle brace to give support/stability to the stifle (see **Figures 1 through 4**). Custom stifle braces can be used pre-operatively in dogs with bilateral CCL insufficiency; the brace is applied to the non-surgical limb as the operated limb is recovering from surgery. The brace can also be used in juvenile patients with open proximal tibial growth plates awaiting surgery; used post-operatively following stifle stabilizing techniques; or used for dogs that are not surgical candidates (due to medical conditions or financial limitations) for long-term use. Early partial CCL tears that are undergoing rehabilitation therapy, patellar tendon rupture repairs, and collateral ligament repairs can be accommodated with use of a custom stifle brace.

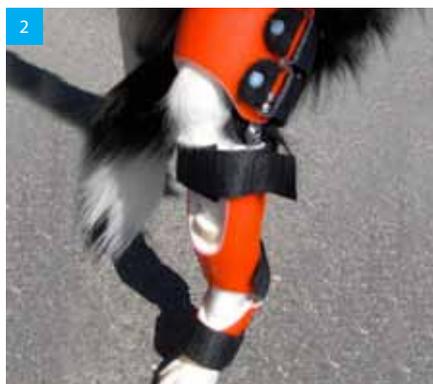
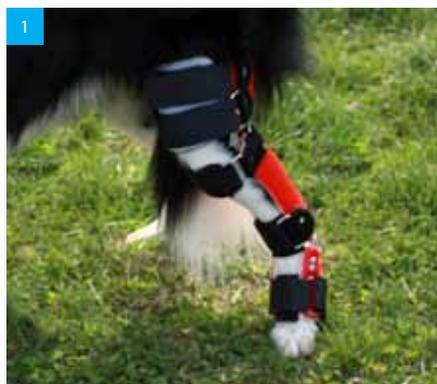


Fig. 1-2: Functional hinged stifle brace. Courtesy Animal Orthocare, animalorthocare.com

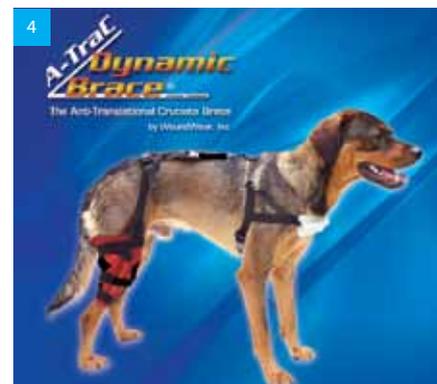
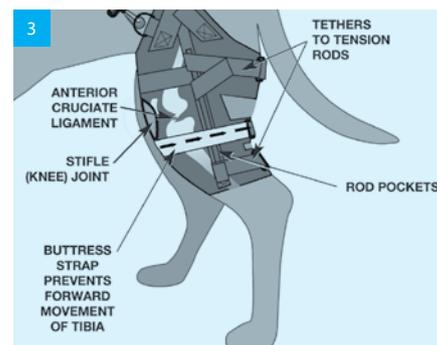


Fig. 3-4: A-Trac Dynamic Stifle brace. Courtesy A-Trac Dynamic Brace and WoundWear, woundwear.com



*Carpo-flex neoprene carpal support wrap
Courtesy Thera-Paw, therapaw.com*

Carpal Injury

Carpal injury in agility dogs may range from sprains and strains to complete “carpal collapse” or carpal hyperextension injury. Several devices have been developed to support and protect the carpus as the dog progresses through rehabilitation therapy, or as a long-term option for patients that are not ideal surgical candidates. Carpo-Flex neoprene wraps (see **Figure 5**) are ideal for mild sprains and strains, supporting the carpus following splint or cast removal, or protecting against re-injury for the canine athlete. Where additional support is required, low-temperature thermoplast and/or additional straps may be incorporated into the wrap (see **Figure 6**). These wraps are easily removed and applied for rehabilitation therapy. Where complete immobilization is desired a solid posterior shell design or bivalve (clamshell) designs can be used for maximal support (see **Figure 7**). “Tamarack” joints can be used to reduce hyperextension, while allowing range to assist in a more normalized gait pattern. Range of motion joints are used for more active dogs to allow full range of motion and only limit hyperextension.



*Carpo-flex carpal wrap with thermoplast
for extra support. Courtesy Thera-Paw,
therapaw.com*

Tarsal and Achilles Tendon Injury

Like the carpus, numerous devices have been developed to support and protect the tarsus and Achilles tendon following injury. Tarso-Flex neoprene wraps are ideal for mild sprains and strains, supporting the tarsus following splint or cast removal, or protecting against re-injury for the canine athlete (see **Figure 8**). Where additional support is required, low-temperature thermoplast and/or additional straps may be incorporated into the wrap. Like the carpal wraps, these wraps are easily removed and applied for rehabilitation therapy. Where complete immobilization is required such as following Achilles tendon repair custom hock braces may be used (see **Figure 9**). “Ultraflex” joints can be used to increase range of motion where a contracture (abnormal shortening of muscle or scar tissue) is present. “Tamarack” joints can be used to reduce range of motion or assist motion of the tarsus.

Shoulder Injury

Medial shoulder instability (MSI) has been shown to be a common cause of forelimb lameness in agility dogs. Depending on the severity of the instability, conservative treatment using a rehabilitation therapy program or surgical intervention has been described. While the patient is progressing through the rehabilitation or post-operative period, protecting the shoulder is essential. DogLeggs Shoulder Stabilization System has proven to be a successful part of treatment for shoulder stabilization for both



*Bivalve/clamshell carpal orthosis for maximal support.
Courtesy Animal Orthocare, animalorthocare.com*



*Tarso-flex neoprene tarsal support wrap.
Courtesy Thera-Paw, therapaw.com*



*Hinged functional tarsal brace. Courtesy
K-9 Orthotics & Prosthetics Inc., k-9orthotics.com*

Most dogs adapt to the devices within days to weeks; however, this is largely dependent on owner supervision and compliance. If the device is worn and broken in properly, most animals experience very few skin complications because of the custom fit.



10
Shoulder Stabilization System for medial shoulder instability. Courtesy DogLeggs, dogleggs.com

surgical and non-surgical patients (see **Figure 10**). The device consists of removable, breathable neoprene/polyester sleeves that attach over the shoulders of the patient and Velcro securely to each forelimb. An additional chest strap can then be applied to secure the device to the patient. Double-sided 1" to 2" Velcro strips serve as a hobble strap to attach the limbs together. Patients can bear weight immediately and adapt rapidly to the device. The device limits abduction, flexion, and extension of the shoulder, but allows for full weight-bearing. The patient's gait is altered with a short limited stride, but the device can be worn continuously for several months with minimal irritation. The device can be removed and reapplied easily for rehabilitation therapy. In patients that have undergone arthroscopic treatment (radio-frequency treatment, imbrication, reconstruction, and so on) the device is placed while under anesthesia just before recovery. Patients with severe MSI that have undergone surgical reconstruction are first placed in a custom Velpeau for two weeks followed by DogLeggs Support System for another 10 weeks of continuous wear.

Hip Injury

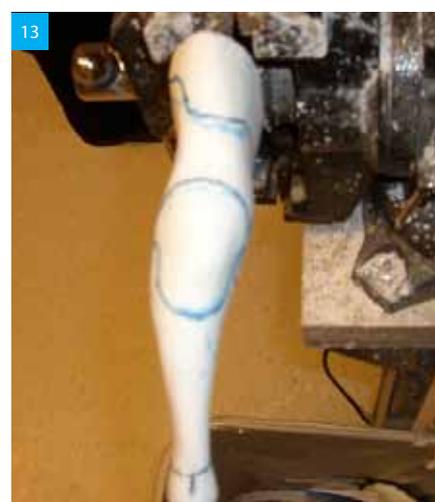
Hip luxations have been reported to occur following falls off the dogwalk or A-frame. Ehmer slings are commonly used to protect the hip following conservative or surgical treatment of hip luxations. Unfortunately, the standard Ehmer sling cannot be easily removed and reapplied thereby limiting the therapist's ability to perform rehabilitation exercises. In addition, depending on the materials used, Ehmer slings may cause secondary skin irritation and abrasions. DogLeggs VEST with Ehmer Sling is a custom form-fitting sling that allows for proper positioning and immobilization while also allowing access for rehabilitation therapy (see **Figures 11 and 12**). The VEST and Ehmer Sling are manufactured using Breath-O-Prene Silvertex, a hook-compatible "fabric" that is stretchable, breathable, antimicrobial, antibacterial, and bactericidal. The VEST's hook-compatible exterior provides the ability to adjust the garment to comfortably fit the patient. The design of the VEST allows for total range of movement of unaffected limbs. The patient experiences no discomfort or restriction of activity due to wearing the VEST. The Ehmer Sling is attached directly to the VEST by use of Velcro hook fasteners. By having the VEST supporting the Ehmer Sling, the patient better tolerates treatment over long-term wear.

Construction and Fitting

The most important step in creating a custom stifle brace is to take a proper cast mold of affected limb(s) (see **Figure 13**). The functional angle must be reflected in the cast as accurately as possible; however, the actual casts can be modified to some degree. The



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Fig. 11-12: VEST with Ehmer Sling for hip stabilization. Courtesy DogLeggs, dogleggs.com



13
*Creation of a custom stifle brace by making a proper cast mold of the affected limb
Courtesy Animal Orthocare, animalorthocare.com*



Custom made functional hinged stifle brace from cast mold in Figure 13. Courtesy Animal Orthocare, animalorthocare.com

The development of these devices has helped treat and maintain many orthopedic conditions and injuries successfully, with and without surgical intervention. These devices often provide an alternative to surgery when combined with proper introduction, maintenance, and rehabilitation.

cast is then poured with plaster of Paris to create a positive model of the affected limb(s). The mold is modified to accommodate for bony prominences and sensitive areas, and sculpted to fit the affected limb(s). Foam and high-temperature thermoplastics are heated and vacuum formed around the mold in varying layers/designs to create the most functional custom product for each dog (see **Figure 14**).

For the A-Trac Dynamic Stifle brace and support systems such as carpal and tarsal wraps, shoulder stabilization system, and custom vest Ehmer sling, obtaining proper measurements for ordering and construction is imperative.

The custom orthosis must be worn in short, increasing increments to build up a tolerance to the device. Both the length of the break-in period and the time of each increment will depend on the dog's diagnosis. For best results, the brace is applied for only one hour the first day and increases by one hour per day. If there is any irritation or skin breakdown, discontinue use for one full day. A short period of time is required before the dog accepts the orthotic device. To facilitate the dog's acceptance of the device, the orthosis/prosthesis should be associated with positive reinforcement. Unlike the custom orthosis, the support systems are typically placed on the patient immediately following injury or surgery and worn for long periods of time. These systems have been designed to allow for easy removal/access to the affected limb for rehabilitation therapy and inspection for soft-tissue irritation. These devices can easily be modified to relieve any areas of irritation. It is also important to inspect the device regularly for any cracks or tears. Padding and Velcro can be replaced. Patients can wear their devices comfortably for extended periods of time without discomfort or irritation, which is a common problem when using adhesive tapes and wraps.

Most dogs adapt to the devices within days to weeks; however, this is largely dependent on owner supervision and compliance. If the device is worn and broken in properly, most animals experience very few skin complications because of the custom fit. The development of these devices has helped treat and maintain many orthopedic conditions and injuries successfully, with and without surgical intervention. These devices often provide an alternative to surgery when combined with proper introduction, maintenance, and rehabilitation.

Dr. Canapp, a Diplomate of the American College of Veterinary Surgeons, completed a combined DVM/MS at Kansas State University, an internship in small animal medicine and surgery at the University of Missouri, a three-year residency in small animal surgery at the University of Florida, and training in canine rehabilitation by the Canine Rehabilitation Institute. Dr. Canapp practices orthopedic surgery and sports medicine at the Veterinary Orthopedic & Sports Medicine Group (VOSM) in Annapolis Junction, Maryland, and acts as a consultant to regional zoos, police K-9 and search and rescue units, and national agility, flyball, and disc dog organizations. See additional information about Dr. Canapp at www.vetsportsmedicine.com.
